

ABSTRACT OF THE DISCLOSURE

This technology provides a method (application) of an algorithm to facilitate the design of wideband operations of antennas, and the design of sleeve cage monopole and sleeve helix, units. The technology is of interest/commercial potential throughout the audio communications community.

Omnidirectional capabilities and enhanced wideband capabilities are two desirable features for the design of many antenna applications. Designing omnidirectional antennas with wideband capabilities requires rapid resolution of complex relationship among antenna components to yield an optimal system. The invention comprises the use of a genetic algorithm with fitness values for design factors expressed in terms to yield optimum combinations of at least two types of antennas.

Cage antennas are optimized via a genetic algorithm (GA) for operation over a wide band with low voltage standing wave ratio (VSWR). Numerical results are compared to those of other dual band and broadband antennas from the literature. Measured results for one cage antenna are presented.

Genetic algorithms and an integral equation solver are employed to determine the position and lengths of parasitic wires around a cage antenna in order to minimize voltage standing wave ratio (VSWR) over a band. The cage is replaced by a normal mode quadrifilar helix for height reduction and the parasites are re-optimized. Measurements of the input characteristics of these optimized structures are presented along with data obtained from solving the electric field integral equation.

Genetic algorithms (Y. Rahmat-Samii and E. Michielssen, *Electromagnetic Optimizations by Genetic Algorithms*, New York: John Wiley and Sons, Inc., 1999) are used here in conjunction with an integral equation solution technique to determine the placement of the parasitic wires around a driven cage. The cage may be replaced by a quadrifilar helix operating in the normal mode in order to shorten the antenna. Measurements of these optimized structures are included for verification of the bandwidth improvements.